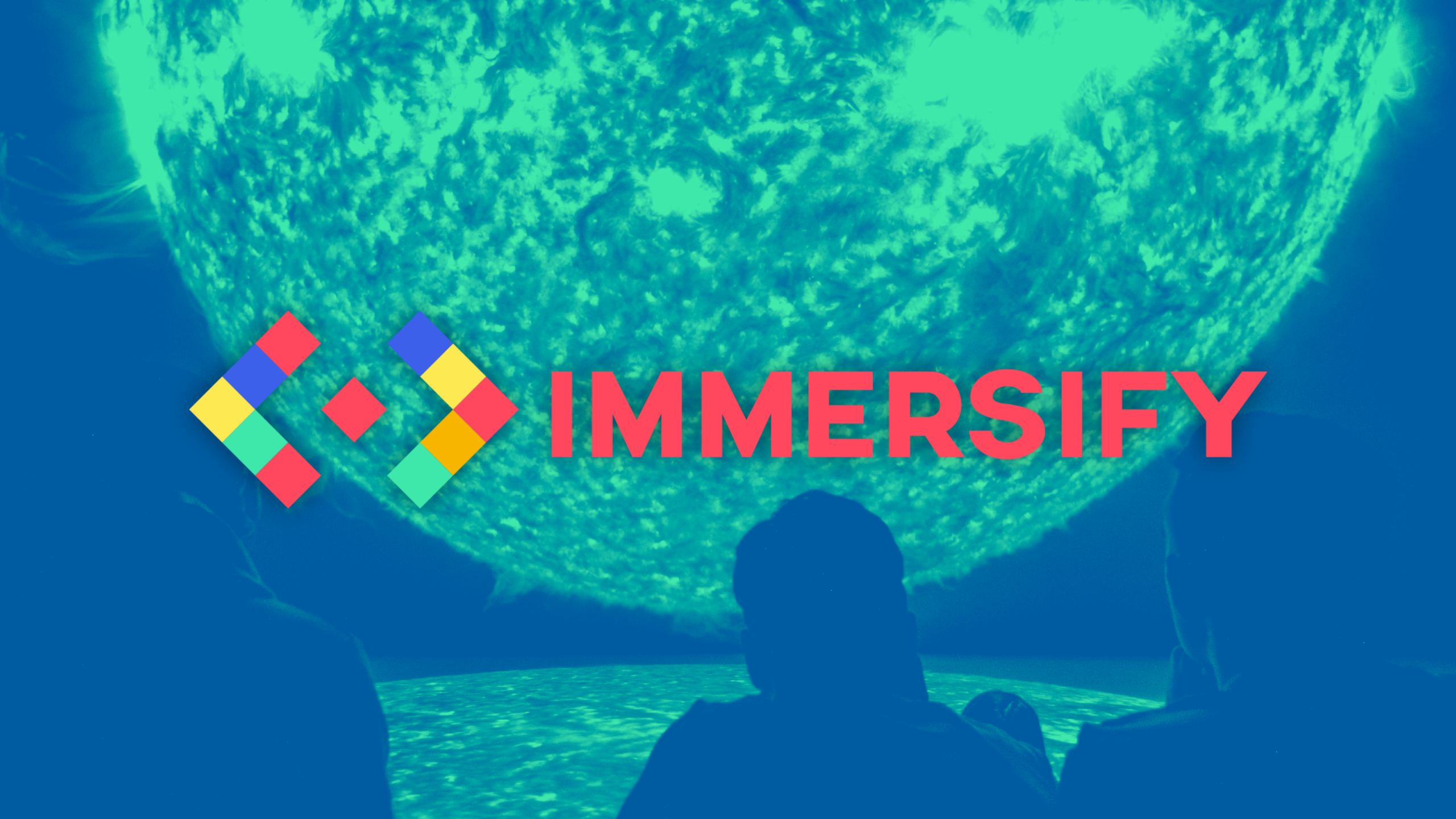
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Audiovisual Technologies for Next Generation Immersive Media

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Immersify Project

Intro

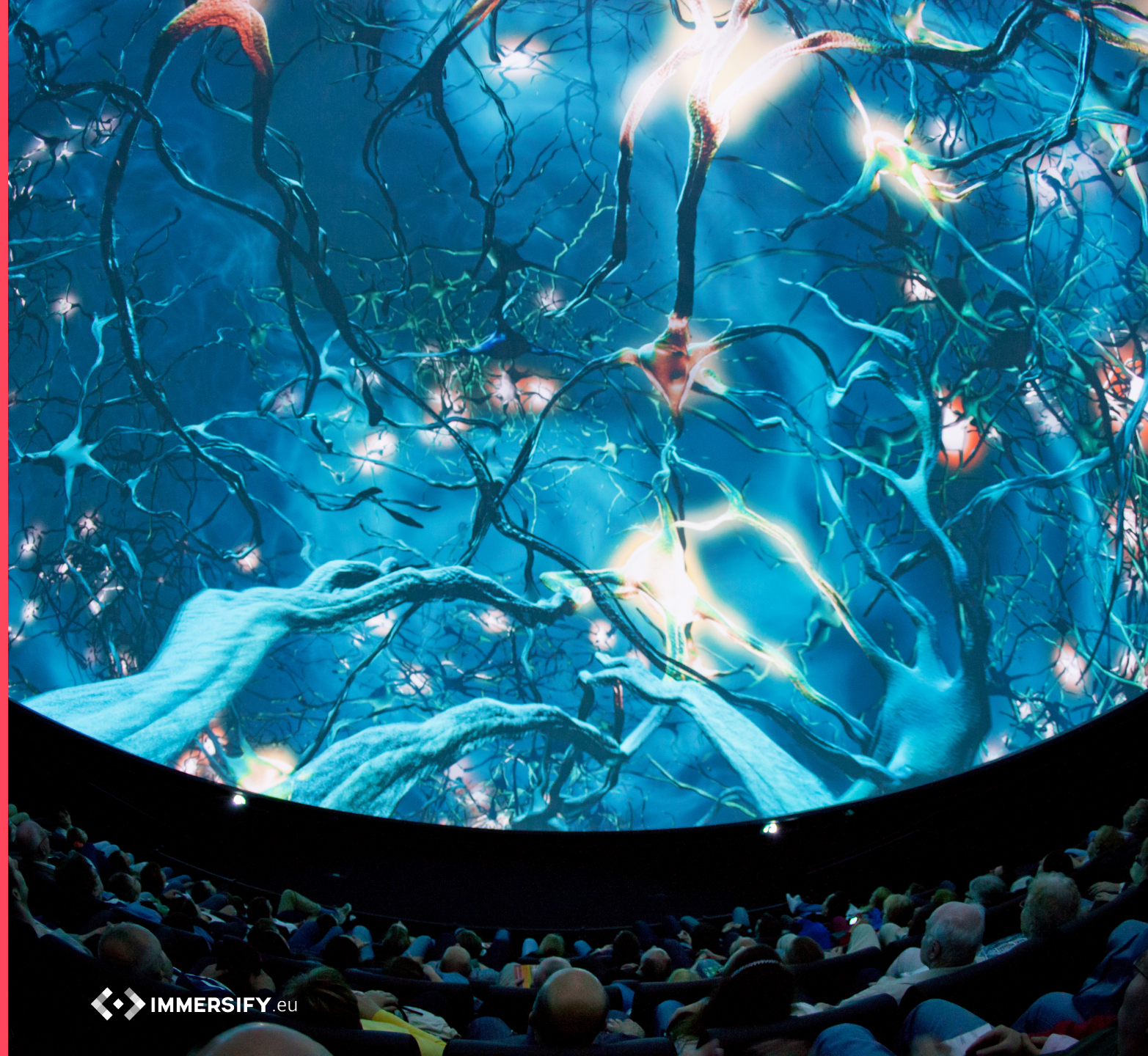
- Audiovisual Technologies for Next Generation Immersive Media
- October 2017 – March 2020
- EU H2020 Innovation Action
- Total funding: 2.5 m €

Project Partners

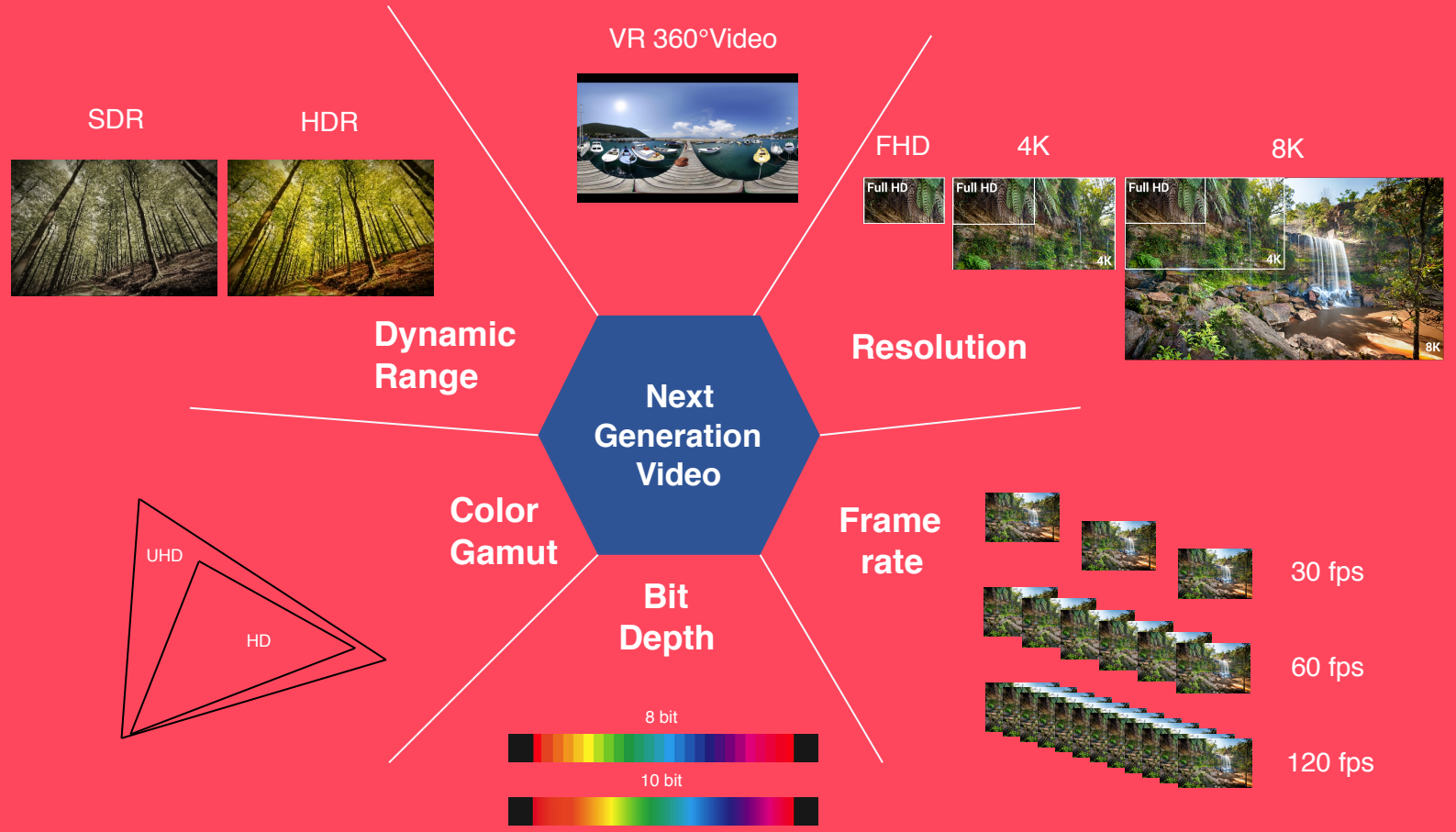
- Poznan Supercomputing and Networking Center - PSNC (Poznan, PL)
- Spin Digital Video Technologies GmbH (Berlin, DE)
- Ars Electronica Futurelab (Linz, AT)
- Marché du Film – Festival de Cannes (Cannes, FR)
- Visualization Center C (Norrköping, SE)

Next Generation Immersive Media

- Immersive: seeming to surround the audience so that that they feel completely involved
- Ultra high resolution (>8K)
- 360° and panoramic video
- Interactive and non-linear
- Immersive & 3D audio



Next Generation Video: Beyond Resolution



Objectives

- Video codecs: improve quality using advanced compression technology
- Multi-Display: enable immersive media for multiple display environments
- Interactive: provide tools for personalized and interactive non-linear storytelling
- Content and Tools: promote immersive media in the creative industries

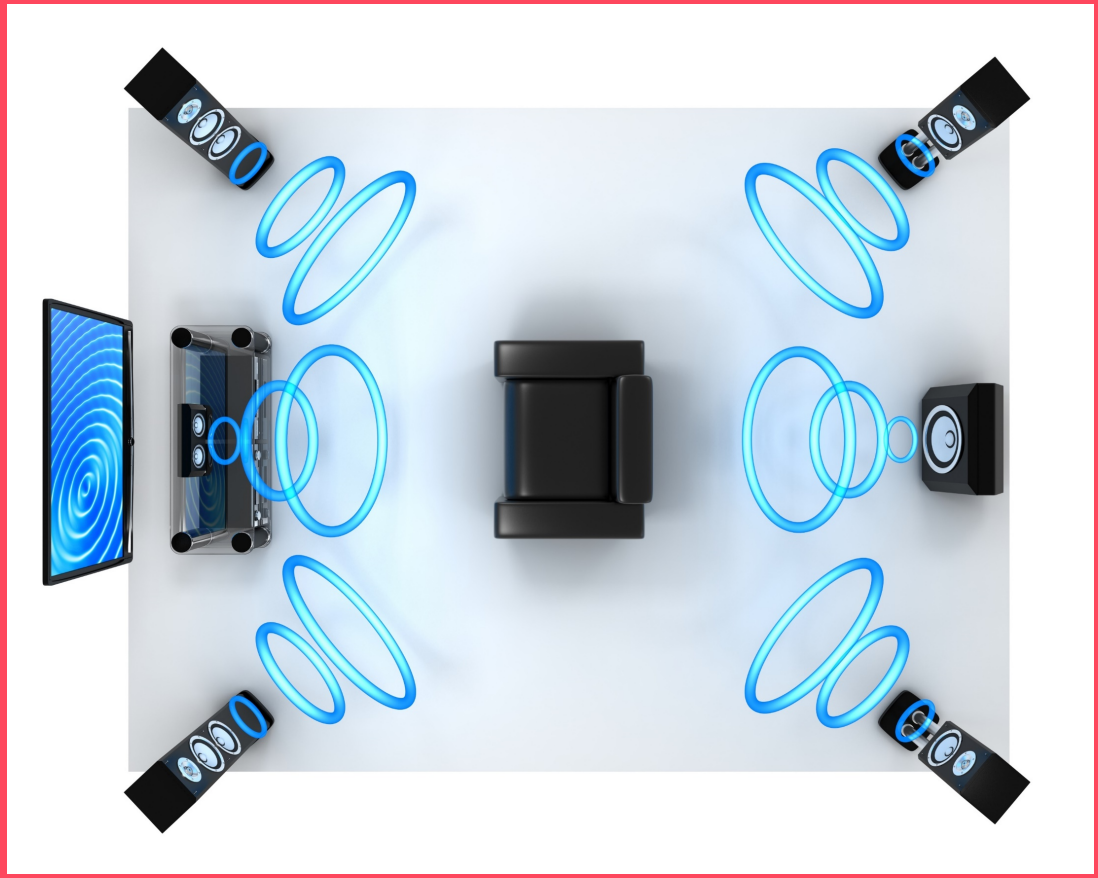
Immersive audio in Immersify

Immersify does not intend to develop innovations in audio coding technology

Integrate existing formats and tools for spatial audio into VR media playback and streaming solutions

Multichannel up to 22.2, audio objects and ambisonic

Experimental content production and technology testing



Ambisonics test and experiments

Main objectives

- Obtain music content for work and experiments with 3D Audio
- Prepare and build monitoring system
- Make aproperiate workflow for such realizations
- Do tests connected with binaural reproduction of 3D audio
- Combination 3D audio with VR technologies

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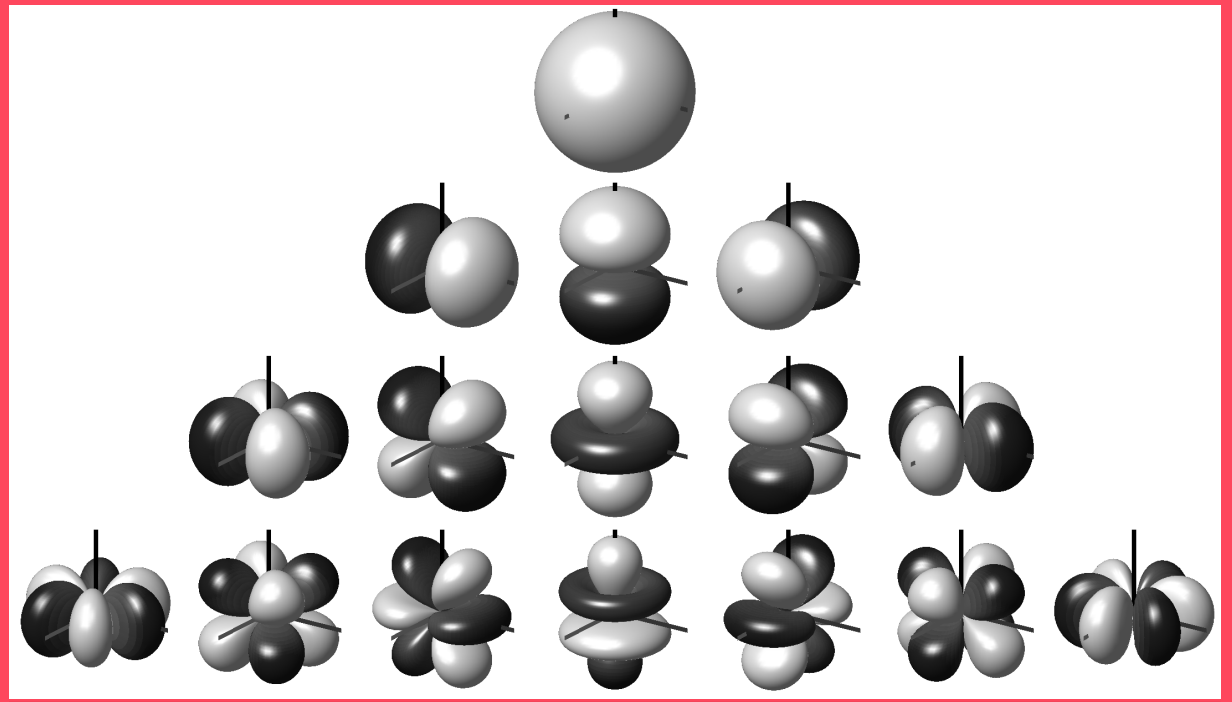
Ambisonics test and experiments

Ambisonics?

- Developed in 1970 at British National Research Development Corporation
- Speaker - independent representation of sound field based on spherical harmonics
- Today he most popular ambisonics format is **ambisonics B format**



Recordings

- We had to find interesting band with wide line up and varied material
- We invited the jazz band „Anomalia” to cooperate with us
- We had to figure out the way of recordings for such realization
- We rorded all event in 8K and 360°

Recordings

Recordings

Recordings

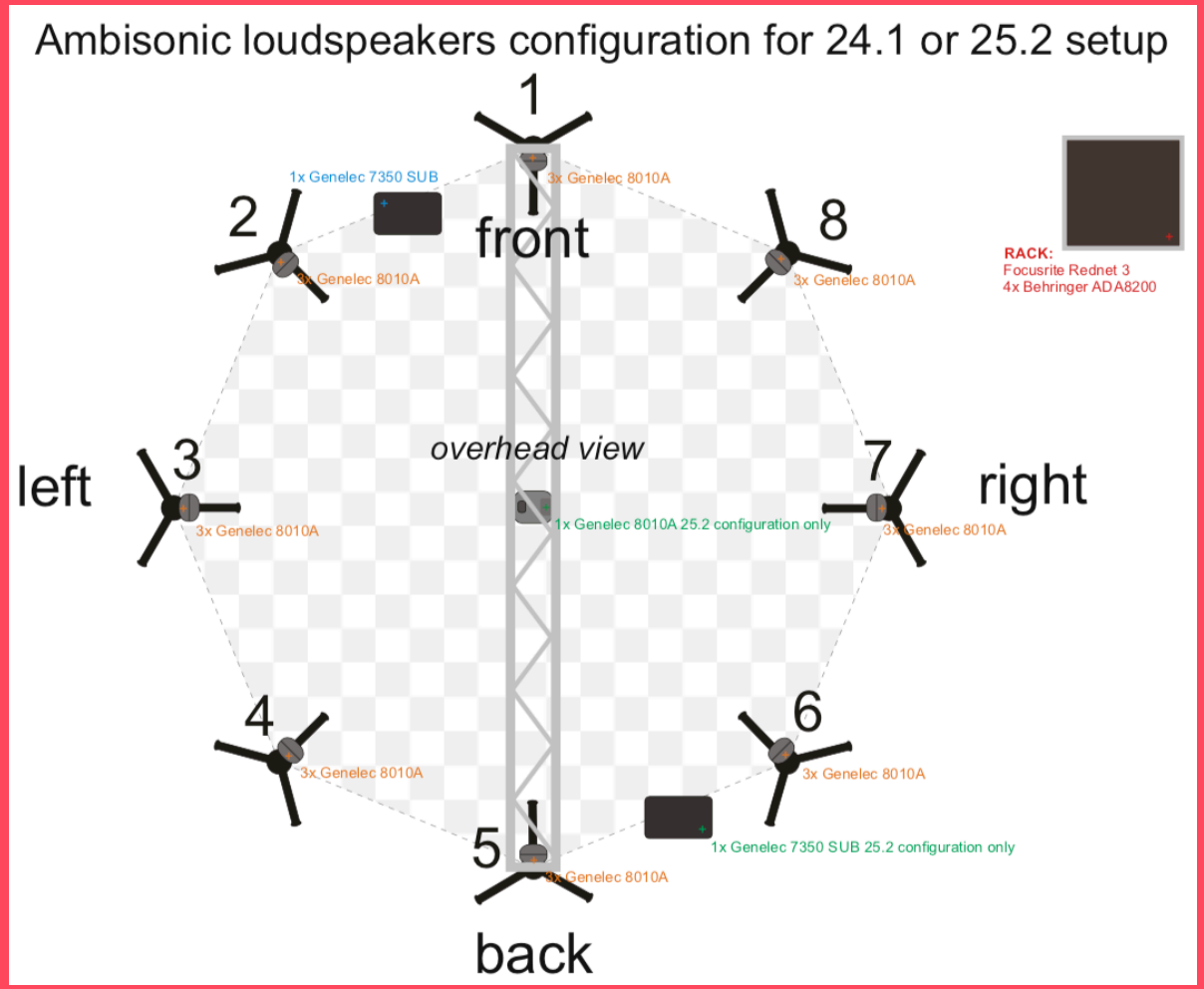
List of microphones

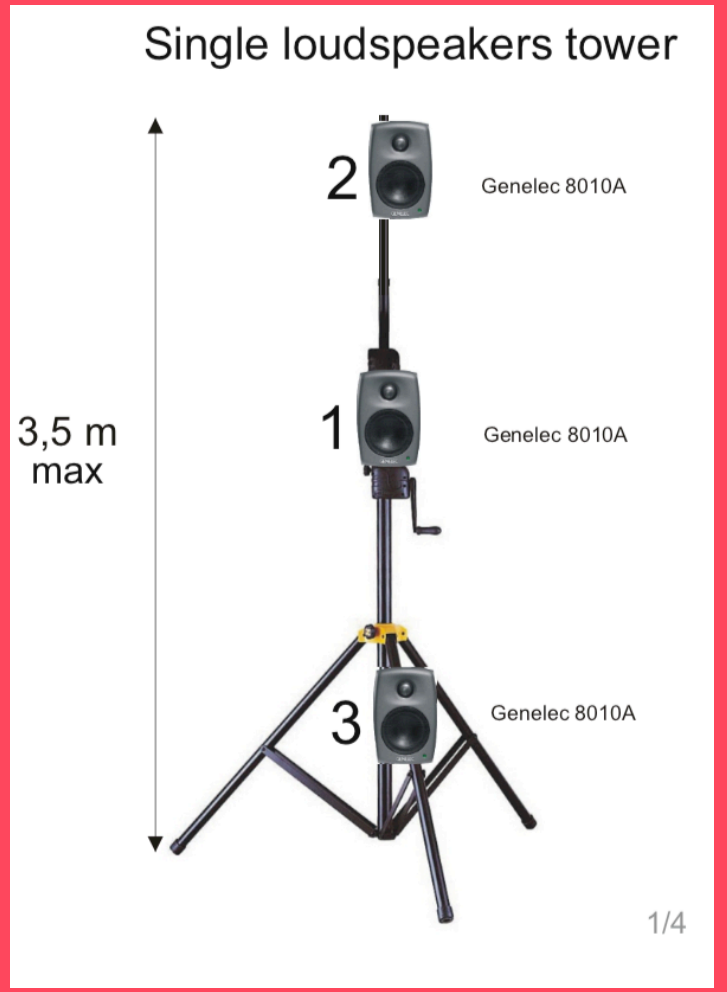
- Trombone - DPA 4099
- Trumpet - Se Electronics Voodoo VR1
- Tenor saxophone - Se Electronics Se2200a II, DPA 4099
- Alt saxophone - DPA 4099
- Guitar - Audio Technica AT 2050, Shure sm 57
- Doublebass - DPA 4099, line from bass amplifier
- Drums
- Ambience - Sennheiser AMBEO VR MiC

Monitoring system

- Spherical ambisonics monitoring system
- Consist of 24 loudspeakers and one subwoofer
- Speakers located on 3 hexagonal planes
- All system operated with Audinet Dante protocol
- Whole installation is based on easy removal segment which allow us for fast assembly

Monitoring system



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KLANG:fabrik
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Ambisoninc audio installation at Poznan Supercomputing and Networking Center

Monitoring system

Connection

Computer with Reaper

Focusrite rednet 3

4x Behringer ada 8200

24x genelec 8010a
1x genelec 7350 sub

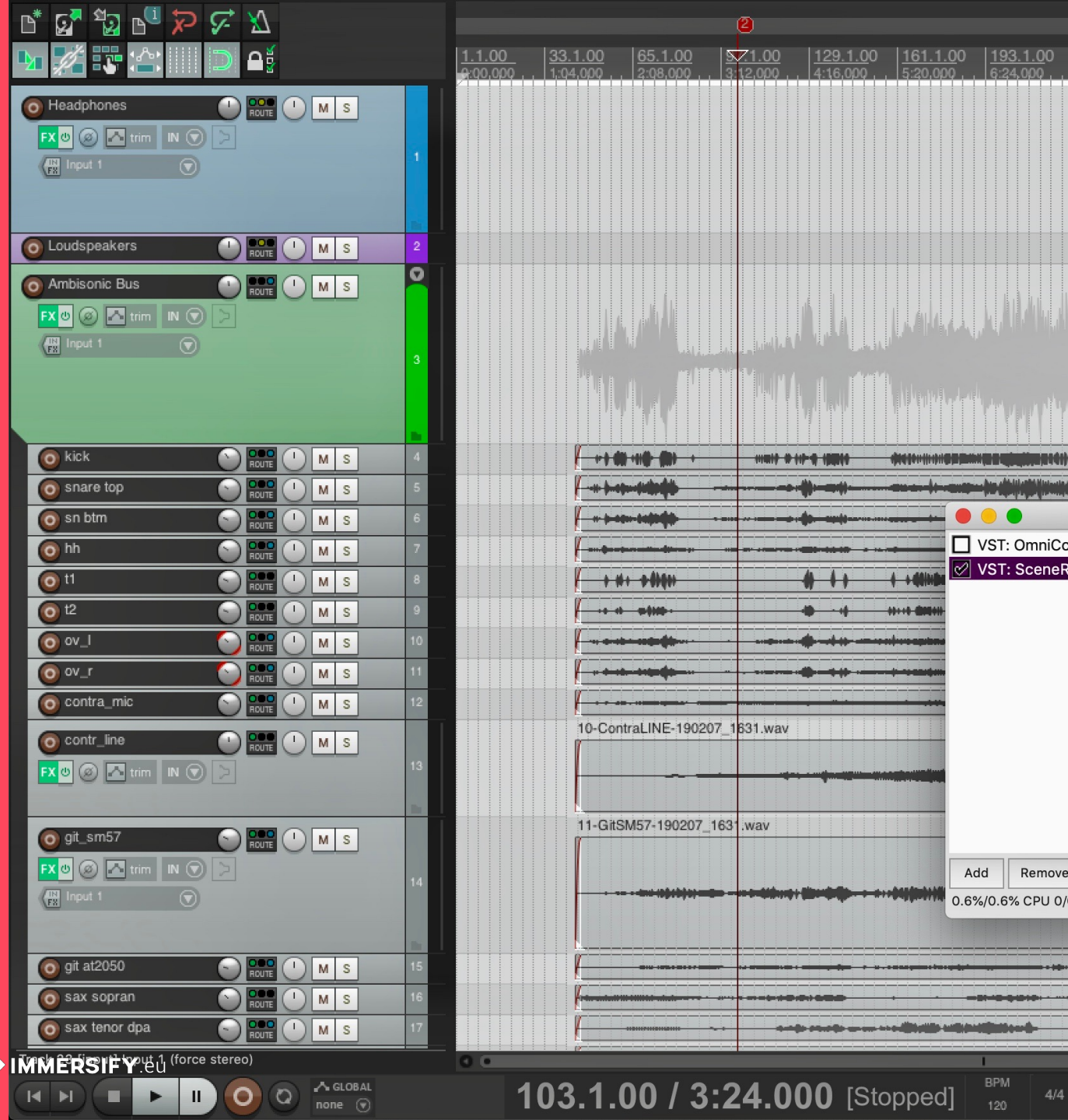
Dante protocol

4x ADAT

Up to 32 phisical outputs

Mix

- Find appropriate tools (DAW, plugins etc.)
- Elaborate own workflow
- Change our thinking about mixing in order to 3D audio



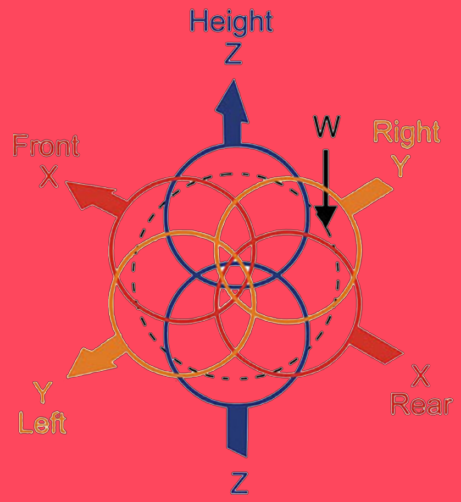
Mix

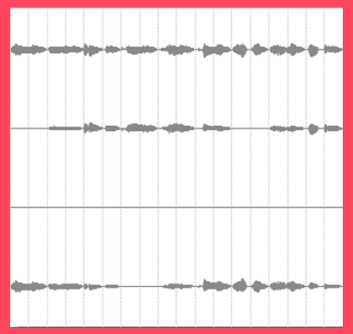
Mono or stereo audio track

Source sptialazing

B format multichannel audio

Any ambisonics monitoring system





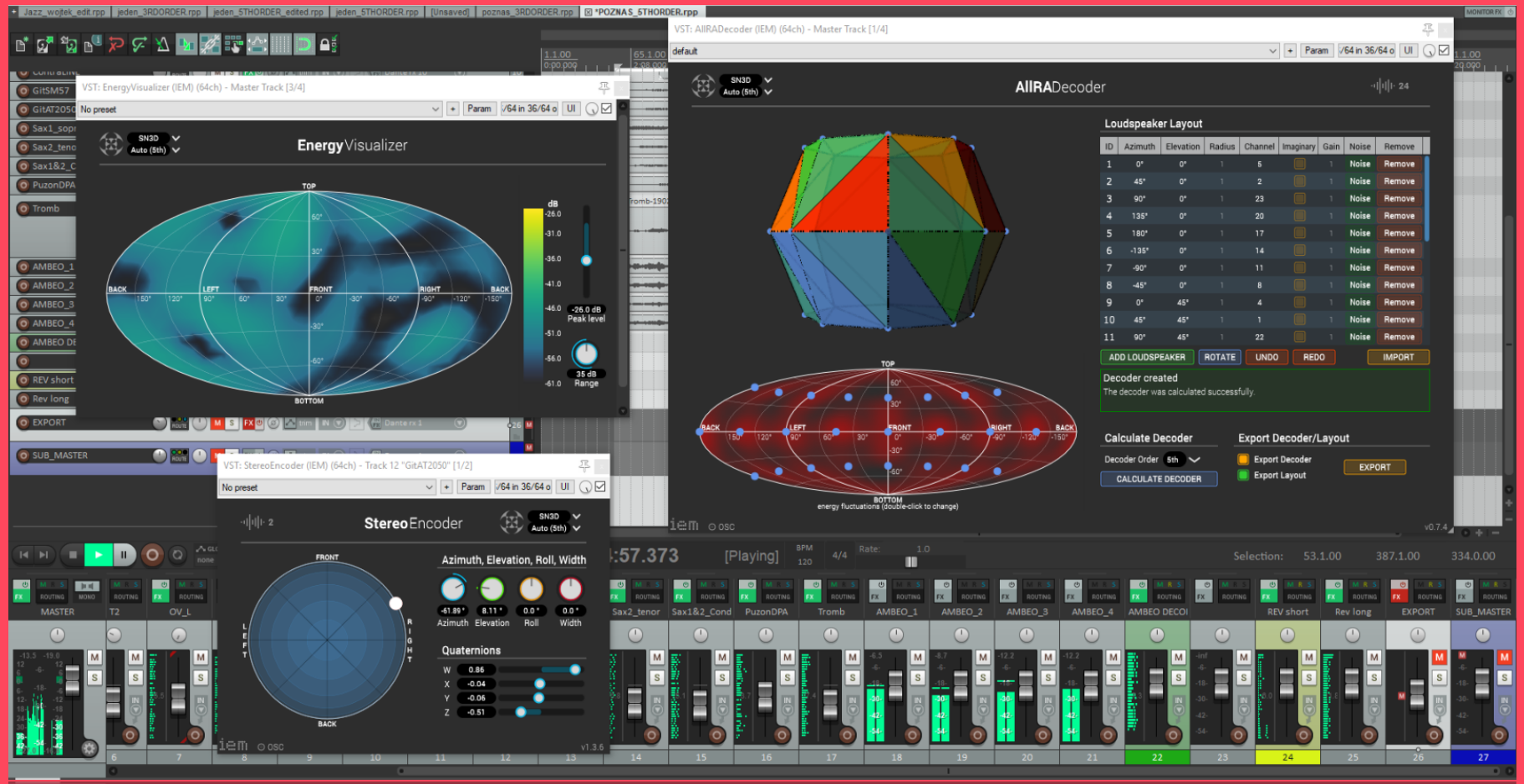
Encoding stereo or mono audio to B format

Exporting audio as B format multichanel

Decoding for any ambisonics monitoring system or headphones

Mix

Tools


EnergyVisualizer
AllRADecoder
StereoEncoder
Loudspeaker Layout
Azimuth, Elevation, Roll, Width
Quaternions
Calculate Decoder
Export Decoder/Layout

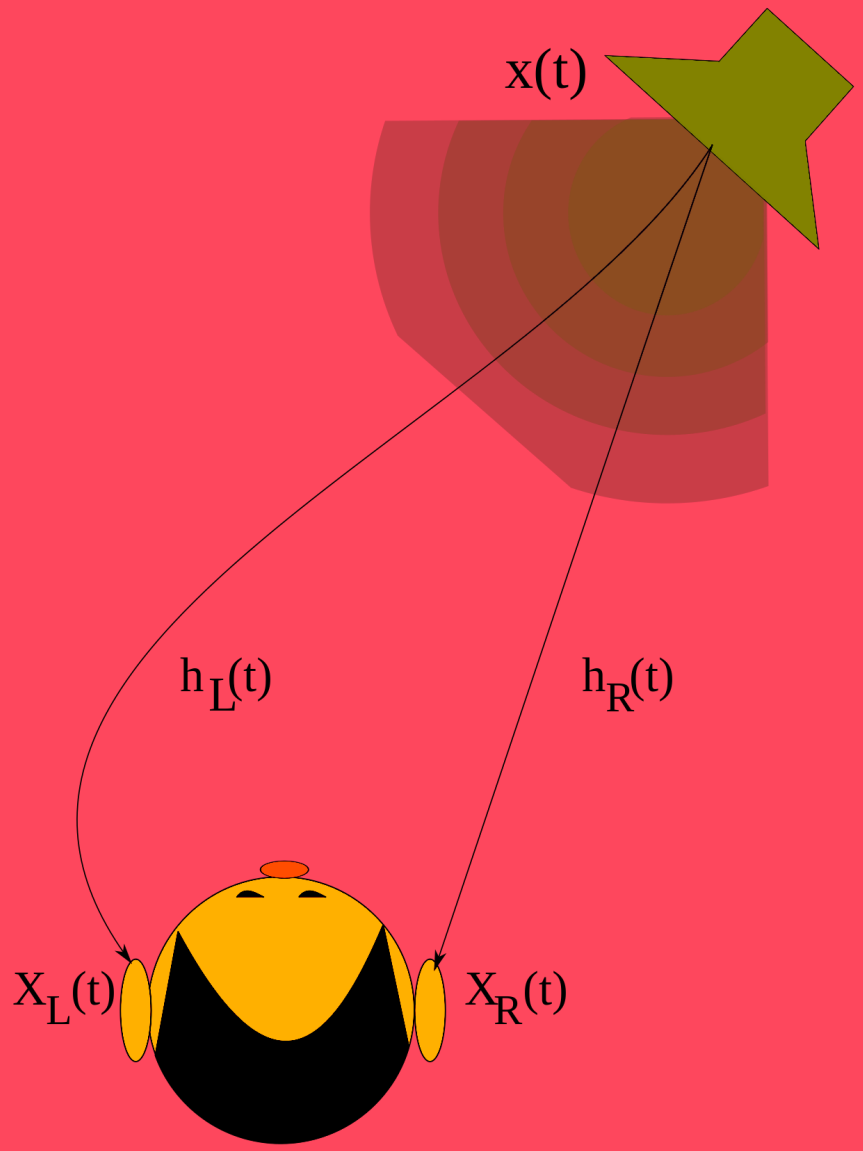
Binaural representation

- In order to experiments with 3D audio we also wanted to test some tools for binaural representation
- We needed to find a easy way to demonstate our works (youtube and facebook supports ambisonics B- format up to 1st order)

Binaural representation

HRTF

- Humans have ability for receiving spatial sound in natural environment
- It is possible because our brains's capabilities of analyzing received signal. It can distinguish delay, amplitude and phase of receaved sound between ears.
- HRTF function is response that characterize how our ears receives an sound from a point of space.



Binaural representation

Klang:fabrik

Ambisoninc audio installation at Poznan Supercomputing and Networking Center
Binaural sound demo. Please wear headphones

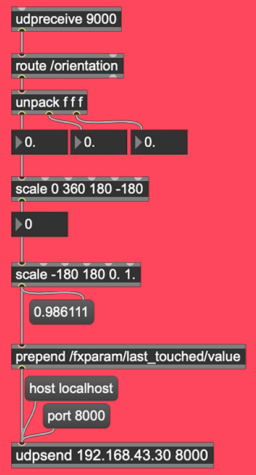
Binaural reproduction

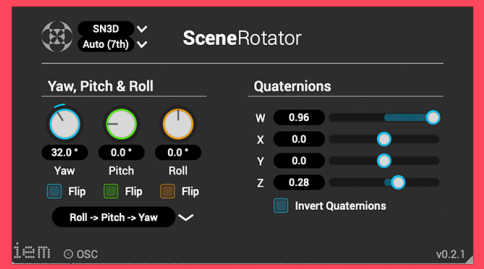
Easy reaplacment

Sensor data from phone

simple max/msp Patch

Easy control of any plugin's parameters





OSC
open sound control

OSC
open sound control

binaural decoded audio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Accelerometer
Magnetic Field
Magnetic Field...
Orientation
Light
Multi Touch
Ambisoninc audio installation at Poznan Supercomputing and Networking Center
Binaural sound demo. Please wear headphones

3D audio and VR

- Nowadays there are no available VR players which supports Ambisonics B format higher than 1st order
- We needed to find a way to synchronize 360° degree video with ambisonics audio

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 7620799

PSNC - Poznan Supercomputing and Networking Center

Spin Digital Video Technologies GmbH

Ars Electronica Linz GmbH & Co KG

Marché du Film – Festival de Cannes

Visualization Center C

Thanks for your attention!

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